NATIONAL COAL MINE GEOSPATIAL COMMITTEE AND AML RECLAMATION PROGRAMS: DIGITAL DATA TO REDUCE THE AML INVENTORY AND PROTECT THE PUBLIC[1].

Len Meier[2]

Abstract

Landscape level digital data associated with past and present mining operations can provide substantial benefits to government agencies, the public and to business interests when planning land reclamation, management, and land use activities in previously mined areas. A National Coal Mining Geospatial Committee (NCMGC) was formed in 2005 to support and promote the use of digital data for improved regulation of active coal mining, more successful reclamation of abandoned mines, and better informed local, state and national public policy decision making in the future. The NCMGC was formed by a partnership between the Office of Surface Mining (OSM), the National Association of Abandoned Mine Land Programs (NAAMLP), the Interstate Mining Compact Commission, and the Western Interstate Energy Board. It is sponsored and supported by OSM's Technical Innovation and Professional Services (TIPS). In June 2006, the NCMGC conducted its first major event, a meeting of the Coal Mining Geospatial Data Stewards, in Denver Colorado. Coal Mine Data Stewards are representatives from each state/tribe AML and Regulatory Program who best understand how geospatial data are used and managed in that program. Significant accomplishments of the meeting include identification of the goals of State/Tribe/OSM and MSHA for use and acquisition of geospatial data; identification of roadblocks to data acquisition and usage; and recognition of the importance of national data standards for certain nationally significant data layers. Participants decided to form a work group to take on development of the two initial data layers of national significance: surface coal mining boundaries and underground coal mining boundaries. The workgroup will establish voluntary data standards for each layer. At the same time, OSM personnel have begun working on a proof-of-concept for a system of compiling data for each layer from all states/tribes (when available) for inclusion into national data sets for publication (with needed access controls) to appropriate parties. This paper will outline the past and planned activities of the NCMGC along with expected benefits to coalfield citizens and to AML Reclamation Programs.

Keywords: Coal Mine Data, Underground Mine Data, Coal Mine Geospatial.

---

[1]Paper was presented at the 2006 National Association of Abandoned Mine Land Programs 28th Annual Conference, September 25-27, 2006, Billings MT.
[2]Len Meier is Chief of the Program and Technology Support Branch in the Office of Surface Mining's Mid-Continent Regional Office in Alton, Illinois, 62002.

NATIONAL COAL MINE GEOSPATIAL COMMITTEE AND AML RECLAMATION PROGRAMS: DIGITAL DATA TO REDUCE THE AML INVENTORY AND PROTECT THE PUBLIC

Len Meier

Introduction

Underground mines present the greatest remaining mine-related threats to public health, safety and property as we approach the 30th anniversary of the Surface Mining Control and Reclamation Act (SMCRA). Even through abandoned mine land (AML) reclamation programs have made great progress in reclaiming AML high priority problems, the identified inventory of unfunded problems continues to grow. Of significant note is the increase in growth associated with underground mines. Since 1993, the unfunded portion of the Abandoned Mine Land Inventory System (AMLIS) primarily associated with underground mining has risen significantly faster than the portion associated with surface mines. The National Coal Mine Geospatial Committee (NCMGC) is providing leadership and resources to OSM and State AML Programs to increase their effectiveness through the use of geospatial resources such as underground and surface mine maps and other mining related GIS data layers. The NCMGC is working with State and Federal AML Programs to encourage developing *"coal mine data layers of national significance"* and associated national data standards. The NCMGC believes that development and use of standardized mining data layers by mine regulatory and reclamation programs, state and local planning organizations and the public will result in improved reclamation success, better informed public policy decisions, reduced future exposure of people to AML hazards, and reduced future costs associated with abandoned mines.

Background of the NCMGC

The National Coal Mine Geospatial Committee is a partnership formed by the Office of Surface Mining (OSM) and the States and Tribes authorized to administer SMCRA. The committee is made up of one representative each from OSM headquarters and three regional offices, the National Association of Abandoned Mine Land Programs (NAAMLP), the Western Interstate Energy Board (WEIB) and the Interstate Mining Compact Commission (IMCC). It is supported by OSM's Technical Innovation and Professional Services (TIPS) program.

Goals of the NCMGC

The NCMGC partnership has several major goals:

- Identify and promote geospatial technologies that increase the effectiveness and efficiency of organizations working on SMCRA related projects,
- Ensure that scientifically sound geospatial services are provided in an efficient and cost effective manner to the SMCRA community,
- Develop "coal mine data layers of national significance" where States and Tribes may contribute mine related data in standard and universally functional format,
- Develop a method or methods for making "coal mine data layers of national significance" available to the public and to state and local organizations at a scale that is appropriate for the decision making needs of each user group.

Activities of the NCMGC

The NCMGC was formed in late 2005 as an outgrowth of OSM's 2004 SMCRA Geospatial Conference in Atlanta Georgia. In June 2006, the NCMGC conducted its first major event, a meeting of the SMCRA Coal Mining Geospatial Data Stewards in Denver Colorado. Coal Mine Geospatial Data Stewards are representatives from each State/Tribe/OSM AML and Regulatory Program who best understand how geospatial data are used and managed in that program. Thirty five State and OSM personnel and one person each from the mining industry and Mine Health and Safety Administration (MSHA) attended the meeting to kick off what will be a long term effort to promote better and more effective acquisition and use of geospatial data in the operation of Abandoned Mine Land and Coal Regulatory programs and in the protection of public safety and investment and miner health and safety. Significant accomplishments of the meeting include:

- identified goals for use and acquisition of geospatial data;
- identified roadblocks to data usage and acquisition;
- identified the importance of nationally available geospatial data associated with some mining related features;
- recognized the importance of national data standards for nationally significant data layers;
- selected two "coal mine data layers of national significance" to begin developing data standards (surface coal mining boundaries and underground coal mining boundaries); and
- Recognized that there are likely to be other coal mine data layers of national significance to be added later.

Participants decided to form a work group to undertake development of the two initial data layers of national significance. The workgroup will establish voluntary data standards for each layer. At the same time, OSM personnel have begun working on the proof-of-concept for a system of compiling data for each layer

from all states/tribes (when available) for inclusion into national data sets for publication (with appropriate access controls) to appropriate parties..

Coal Mining Data Layers of National Significance

Geospatial data has many uses that are significantly enhanced when adjoining jurisdictions collect and manage their data in consistent and familiar formats. Mine related data are no exception to this rule. Before we discuss mining data layers, let's look at an example of more common data that we are all familiar with. A good example is a road map data set.

> When one town prepares a road map using standard line types, sizes and colors, it makes it easy for citizens of that town to understand what kind of road is symbolized by a certain line on a map. When many adjoining towns all use the same map symbols, creating regional maps becomes easy. In emergency situations, emergency planning efforts are greatly enhanced by the use of consistent symbols. When this information is maintained in a geographic information system, then this information is valuable to a wide variety of users because of this consistency. When GIS providers add information related to data accuracy, age and source, decisions may be made about the value of such data for various uses.

Coal mine data layers also gain value when data are standardized. The NCMGC plan to create "coal mine data layers of national significance" will support the efforts of the NAAMLP state staff working to resolve some of the following problems:

- The AML Inventory keeps growing, not because the number of abandoned mines increases, but because more and more people are coming in contact with the hidden relics of those already existing mines. Examples include such mine features as subsidence prone areas, hidden mine shafts and revegetated coal refuse ponds and piles,
- Protection of public health, safety, welfare and property can improved by providing information to the public and to government Institutions that allows for better decisions about how we may use previously mined lands.
- States with adjoining active and abandoned mining regions can enhance protection of underground coal miners and improve hydrology decisions on active mines if data from the adjoining state are available in a consistently usable format,
- Many states are unable for various reasons to post AML information on the internet at a spatial scale that allows local governments and citizens to make accurate land use decisions regarding previously mined areas.
- When people have adequate information on the location of mines and associated hazards, they are likely to make intelligent decisions regarding post mining land uses.

- State AML and Regulatory Programs have stepped up efforts in recent years to collect old underground mine maps before they are no longer available. These maps gain significantly in value to potential users when geolocated, georeferenced and eventually incorporated into readily available geospatial systems.

How can NCMGC efforts protect citizens?

Underground coal mines can be the source of many problems. Here are a few examples:

- Abandoned underground coal mines are the cause of mine subsidence in at least 29 states and on 5 Indian tribal lands, endangering people's lives and livelihood, their homes and businesses, and public infrastructure like roads and pipelines. Nationally available information on the locations of underground mines will make it possible for people to make better decisions on how they use lands above abandoned mines.

- It was not so long ago that we sat riveted to our televisions for three days while we awaited the unlikely but nevertheless successful rescue of 7 miners from the Quecreek Mine in Pennsylvania. The lesson we learned from Quecreek was that inadequate geospatial information about historic underground mines significantly increases the dangers to modern coal miners. NCMGC efforts to develop and host national data sets related to AML hazards can improve the mine planning decisions by mine operators and by permitting agencies that lead to safer conditions for coal miners.

- Underground mine fires burn large amounts of coal, our most available fossil fuel resource, and harm the health and safety of countless citizens who breath the smoke and fumes of these fires. Mine fires can rarely be extinguished without accurate map locations of the mine workings. Information on locations of revegetated coal refuse piles and ponds can reduce chances of these being inadvertently used for purposes which can lead to refuse pile fires, which are often the initial source of underground mine fire ignition. NCMGC efforts to make this geospatial data readily available to local planning agencies can reduce the inappropriate use of mined lands for purposes that may lead to fires and making that same data available to emergency response agencies can reduce the costs and time required of extinguish mine fires, thereby protecting people from the negative effects.

- Acid mine drainage from underground mines costs our nation millions of dollars every year in treatment costs and damages. Geospatial information on the location, depth, dip and water elevation in underground mines can significantly help reclamation planners design treatment techniques and

may provide data to active mining companies on expected results of proposed new mining operations.

- Recent years have seen the breakthrough of both fresh water and coal slurry ponds into historic and relatively modern underground mines because information on those mines was either not available to mining companies and permitting agencies, or was not in a format, scale or known accuracy to facilitate important decisions regarding the placement of new impoundments and other facilities. By working with the NCMGC and making this geospatial data available for appropriate uses by different user groups, State AML Programs can protect lives, homes, public infrastructure and the environment.

How Can NCMGC Efforts Reduce The Growth Of The AML Inventory?

State and Federal abandoned mine land reclamation programs have worked for nearly 30 years to reduce the impacts of abandoned underground coal mines on our citizens. Yet the magnitude of the problems continues to increase. The AML Reclamation Programs have done a tremendous job of reclaiming thousands of acres of mined lands across the nation, making it impossible for most land users to know, without very extensive research, that mine features ever existed on such lands. Ironically, some of the mine features such as coal refuse piles and plugged mine shafts have been made completely safe for current users, they still exhibit serious limitations for land users 20 or 50 or 100 years from now, when development pressure pushes new roads, homes and businesses out into areas where no one lives today. In addition, AML Reclamation Programs may not be able to address all public health and safety problems prior to the expiration of the AML funding authority. Even if all current priority 1 and 2 problems are abated, `potential will remain because the AML program is only set up to address those mine features that are hazardous today. NCMGC efforts to identify the types of features that should be recorded for future generations, then capturing them into national GIS layers, can inform future land users of hidden limitations of such lands and let them make informed decisions regarding appropriate geotechnical investigations and/or design practices to make those lands safe for selected uses.

How can AML Programs Contribute To The effort?

States and tribes can contribute to reducing the growth of the AML inventory by working with the NCMGC in a number of ways:

1. AML Program Managers can discuss the July 2006 Geospatial Data Stewards Meeting with their staff members who attended. Attendees should have a greater sense of the possibilities and opportunities available through the NCMGC.
2. Begin discussions with their representative from NAAMLP (Doug Mullins of Virginia) or their OSM regional representative (Alan Wilhelm from the

Western Region, Len Meier in the Mid-continent Region or Bill Card from the Appalachian Region).

3. Begin compiling geospatial data related to certain AML features reclaimed by the AML Program that have the potential to be hazards to future generations who no longer remember that a mine feature existed at a site. Examples include plugged mine shafts, reclaimed slurry ponds, coal refuse piles, shafts and portals from "gassy" mines, etc.
4. ollect all possible information on underground mines including maps, geologic records and other data,
5. Digitize underground mine boundaries
6. Enter other historic data connected to digitized mines into the underground mine data layer,
7. Maintain an underground mine GIS data layer or send to OSM to maintain,
8. Support the NCMGC efforts to develop, maintain and make public the underground mine data layer and other data layers of national significance

How Can NCMGC Efforts Benefit Other Aspects Of The AML Program?

In our efforts to support Congressional deliberations on AML reauthorization, OSM and the States are regularly asked to provide program accomplishments information, explain why the Inventory dollars never increase and show how certain states or regions are affected by the AML problem. By providing more communication, technology transfer and standardized data layers related to AML, the NCMGC efforts can improve our ability to effectively communicate with Congress and our other constituencies.

Many aspects of AML Program operations have geospatial components and may benefit from GIS analyses. Examples include AML inventory, project ranking and selection, realty, air photography, topographic mapping, reclamation design, project inspection, final project approval and follow up monitoring and maintenance. For lager programs with or any program with widely distributed coal fields, human and other resource management is included. As more and more program managers see value in using computerized geospatial data systems to manage this information and make decisions, the demand for GIS expertise, software and hardware will continue to grow. The NCMGC, through its support by the TIPS umbrella of services, can provide professional technical guidance, assistance and other resources to try new methods of using GIS to enhance our AML operations. State and Tribal programs are significant contributors to the NCMGC and TIPS. Therefore, the technology transfer component of the NCMGC can help inform and facilitate information exchange between AML Programs and lead to data system development at scales where greater efficiencies may be achieved.

Summary

The NCMGC has begun communicating with the Geospatial Data Stewards of each State SMCRA Program to identify ways that Geospatial systems, resources and data can enhance AML reclamation success and provide data to inform future generations of historic mine features that should be considered in future land and resource decisions. Because the NCMGC is supported by the TIPS umbrella, it already has a strong support system including an informed cadre of State, Tribal and OSM staff to guide, inform and move it forward. At its first formal national event, State and OSM Geospatial data Stewards recommended developing two coal mine data sets of national significance: surface coal mining boundaries and underground coal mining boundaries. More than 12 people volunteered to work on developing data standards for those layers. OSM will begin testing a process for capturing the data deemed important by these data standard teams and sharing data across agency boundaries. Developing National Coal Mine Data Layers can lead to improved AML Program Performance, easier and more accurate reporting of accomplishments, and valuable information that can slow the growth of the AML inventory in the near term, and inform future generations about important land use considerations associated with past coal mines. The anticipated benefits of these efforts can only come to fruition with the active participation of State and Tribal AML and Regulatory Programs. Working together, we can realize new and valuable kinds of benefits from our AML Programs today and leave an additional lasting “Information” legacy that compliments the many benefits already produced by 30 years of successful AML reclamation.